

Chechkin, A. V.; Gorenflo, R.; Sokolov, I. M.; Gonchar, V. Yu.

Distributed order time fractional diffusion equation. (English) Zbl 1089.60046

Fract. Calc. Appl. Anal. 6, No. 3, 259-279 (2003).

The authors present the basic theory of time fractional diffusion with distributed orders (between 0 and 1) of the temporal derivative. If there is more than one order present, the density corresponding to the fundamental solution (with the delta function as initial condition) evolves as a kind of retarded subdiffusion (its evolving second moment evolving like time raised to a decreasing power). The authors illustrate such behaviour by plots of results of simulations by a backward oriented approximating random walk based on the Grünwald-Letnikov approximation. Furthermore they show that by special choice of the order density ultra-slow diffusion is obtained (in which the second moment grows like a power of the logarithm of time). They outline the subordination to a Wiener process and hint at the relation to the theory of continuous time random walks.

Reviewer: [Rudolf Gorenflo \(Berlin\)](#)

MSC:

- [60J60](#) Diffusion processes
- [26A33](#) Fractional derivatives and integrals
- [45K05](#) Integro-partial differential equations
- [82C31](#) Stochastic methods (Fokker-Planck, Langevin, etc.) applied to problems in time-dependent statistical mechanics

Cited in **1** Review
Cited in **81** Documents

Keywords:

[fractional derivative](#); [anomalous diffusion](#); [subordination](#)